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NATIONAL DAM SAFETY PROGRAM. MILL DAM (NJ00060), ATLANTIC COAST--ETC(U)
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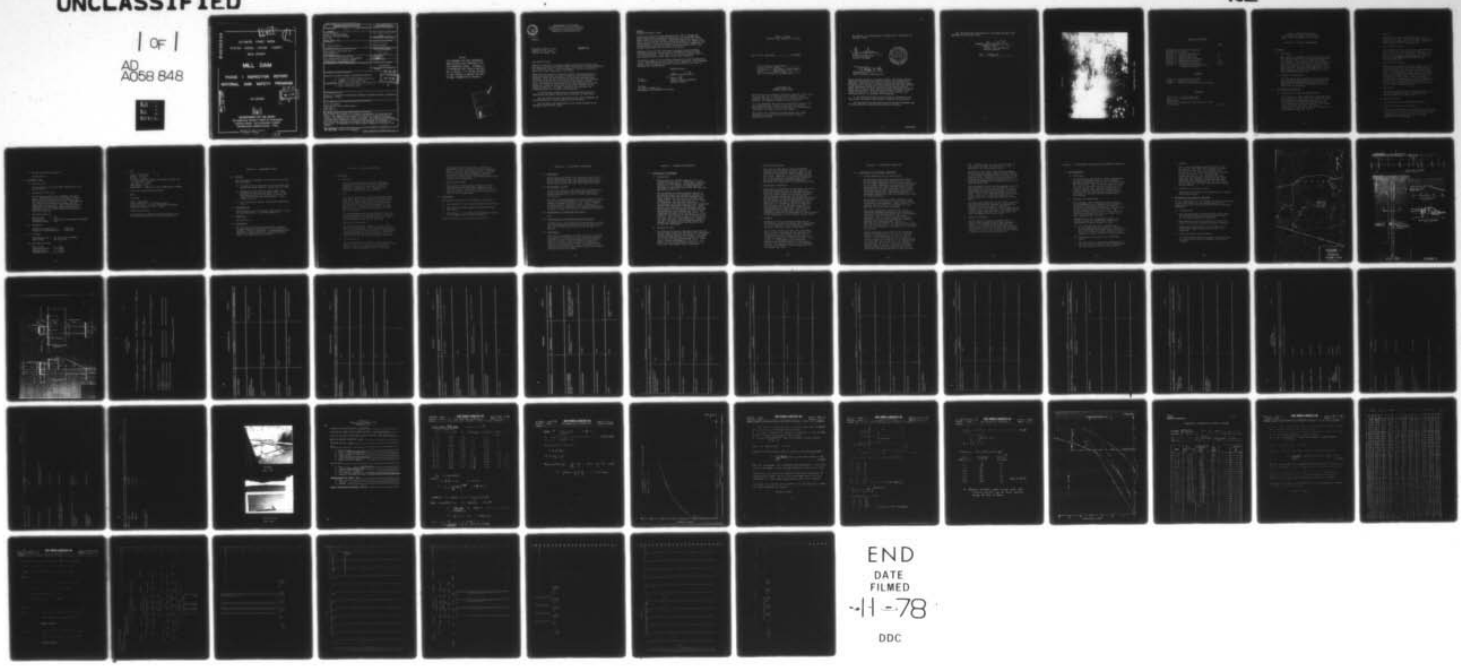

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ATLANTIC COAST BASIN

OYSTER CREEK, OCEAN COUNTY

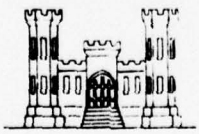
NEW JERSEY

MILL DAM

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

NJ 00060



DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE - 2D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

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3. RECIPIENT'S CATALOG NUMBER

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National Dam Safety Program
Mill Dam
Ocean County, N.J.

5. TYPE OF REPORT & PERIOD COVERED: (9) FINAL rept.
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7. AUTHOR(s): (10) F. Keith Jolls P.E.

8. CONTRACT OR GRANT NUMBER(s): (15) DACW61-78-C-0124

9. PERFORMING ORGANIZATION NAME AND ADDRESS
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East Orange, N.J.

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15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

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(6) National Dam Safety Program. Mill Dam (NJ00060), Atlantic Coast Basin, Oyster Creek, Ocean County, New Jersey. Phase 1 Inspection Report.

17. DISTRIBUTION STATEMENT (of the abstract)

18. SUPPLEMENTARY NOTES

Copies are obtainable from National Technical Information Service, Springfield, Virginia, 22151.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dams--New Jersey
National Dam Safety Program Phase I
Dam Safety
Mill Dam, N.J.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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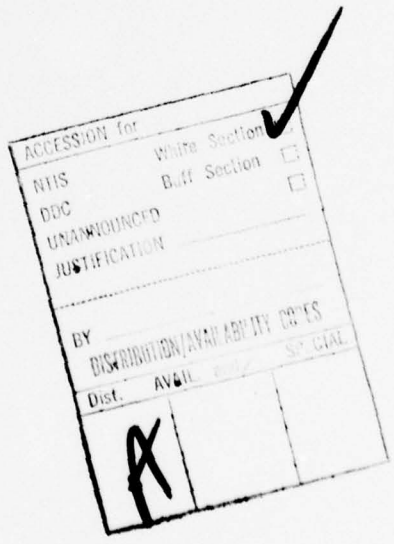


DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE - 2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-D

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

29 AUG 1978

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Mill Dam in Ocean County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given on the first three pages of the report.

Based on visual inspection, available records, calculations and past operational performance, Mill Dam is judged to be in good overall condition. While the dam's spillway is considered inadequate since 45 percent of the 100-year flood would overtop the dam, this condition is not considered serious due to the dam's low hazard potential. (There are no homes or other structures located downstream of the dam and no loss of life is anticipated in the event of failure of this rurally located dam.) To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The following remedial actions should be undertaken by the owner within nine months from the date of approval of this report:

(1) The removal of trees and brush from the dam's embankment and the establishment of suitable ground cover in its place.

(2) The repair and stabilization of the eroded portions of the embankment near the dam's crest.

NAPEN-D
Honorable Brendan T. Byrne

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman William J. Hughes of the Second District. Under the provisions of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, thirty days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia, 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely yours,

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Cy furn:
Mr. Dirk C. Hofman, P.E.
Department of Environmental Protection

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

Name of Dam Mill Dam NJ 00060

State Located New Jersey
County Located Ocean
Coordinates Lat.3940.0 - Long.7430.2
Stream Oyster Creek
Date of Inspection 14 June 1978

ASSESSMENT OF GENERAL CONDITIONS

Mill Dam has an inadequate spillway capacity, being able to pass only 44% of the 100-year frequency event. However, the dam is assessed to be able to withstand moderate overtopping without serious erosion.

It is recommended that further engineering studies not be considered but at some future time the owners undertake to remove the root systems in the embankment and repair the tops of the earth slopes.

The owners are presently reconstructing the earth emergency crest weir which will further insure operational safety.

In summary, no detrimental findings were uncovered to further study.

F. Keith Jolls P.E.
Project Manager

Rudolph Wrubel P.E.
Vice President; Engineering

Based on visual inspection, available records, calculations and past operational performance, Mill Dam is judged to be in good overall condition. While the dam's spillway is considered inadequate since 45 percent of the 100-year flood would overtop the dam, this condition is not considered serious due to the dam's low hazard potential. (There are no homes or other structures located downstream of the dam and no loss of life is anticipated in the event of failure of this rurally located dam.) To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The following remedial actions should be undertaken by the owner within nine months from the date of approval of this report:

(1) The removal of trees and brush from the dam's embankment and the establishment of suitable ground cover in its place.

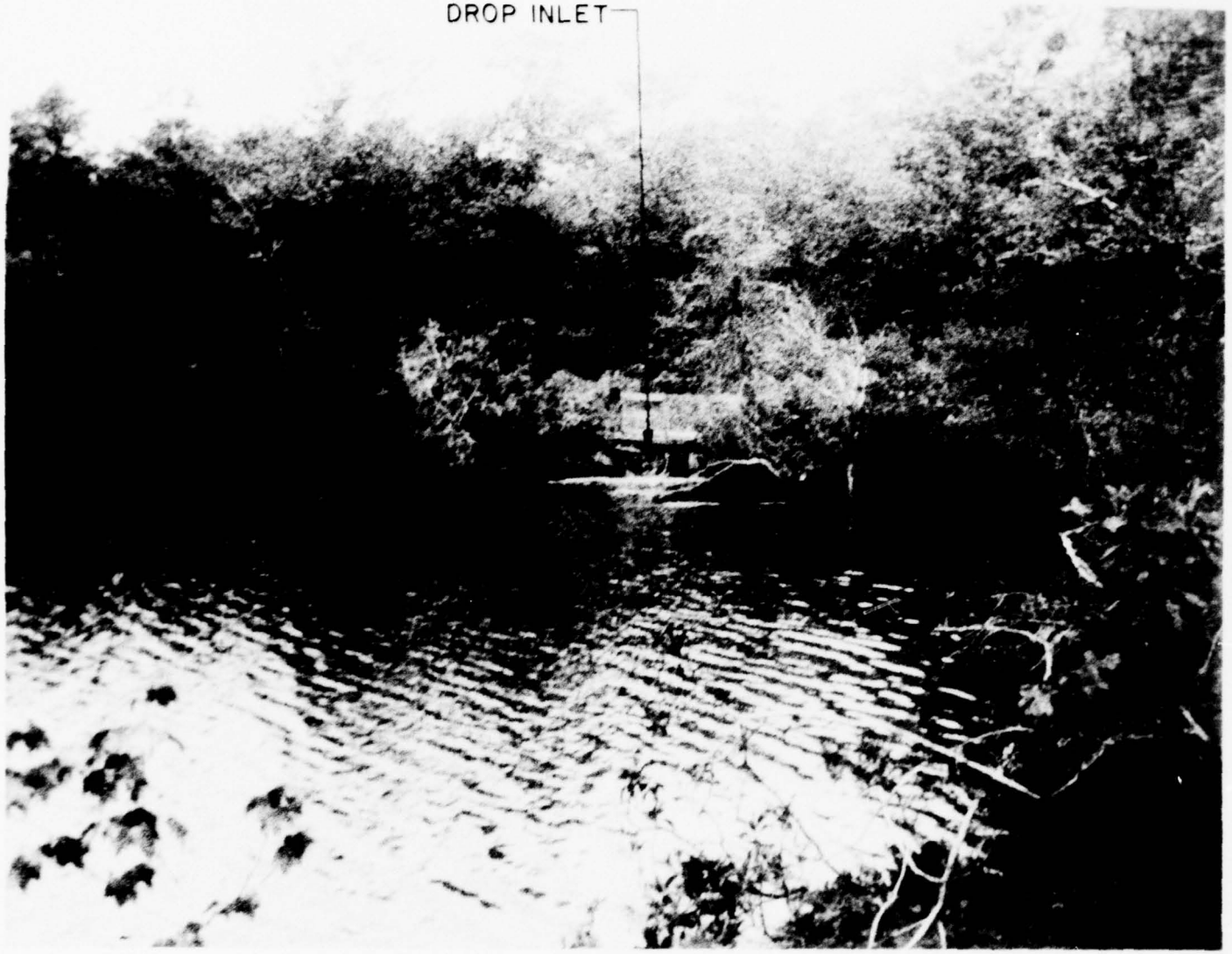
(Continued)

(2) The repair and stabilization of the eroded portions of the embankment near the dam's crest.

APPROVED: James G. Ton

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

DATE: 29 Aug 78



JUNE 1978

OVERVIEW OF MILL DAM

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FIGURES

APPENDIX

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
NAME OF DAM MILL DAM FED# NJ 00060

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

This report is authorized by the Dam Inspection Act, Public Law 92-367, and has been prepared in accordance with contract FPM-36 between Louis Berger & Associates, Inc. and the State of New Jersey and its Department of Environmental Protection, Division of Water Resources. The State in turn, is under agreement with the U.S. Army Engineer District, Philadelphia to have this inspection performed.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the structural and hydraulic condition of the Mill Dam and appurtenant structures, and to determine if the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

Mill Dam is an earth embankment structure with two spillways. The first is a timber box drop inlet with a maximum capacity of 240 c.f.s. The second is an emergency spillway 60 feet in length with a crest elevation 1 foot lower than the top of the dam. The dam is approximately 250 feet long with a narrow dirt road running along the crest.

b. Location

Mill Dam is located near Brookville, Ocean County New Jersey. The dam is built across the Oyster Creek approximately 1.3 miles upstream from the Wells Mills reservoir dam.

c. Size Classification

The maximum height Of the dam is approximately 12 feet and the conservation storage is estimated to be 22.5 acre feet. Therefore the dam is in the small size category as defined by the Recommended Guideline for Safety Inspection of Dams.

d. Hazard Classification

There are no residential areas immediately downstream from the dam. The area that would be affected should the dam fail, is mainly marshland. The Boy Scouts do not camp in the lowlands area immediately downstream and only use the area seasonally for hiking. There is one structure in the vicinity, the Wells Mills dam which is approximately 1.3 miles downstream. In the event of both dams failing, property damage still is minimal and therefore the Mill Dam is classified low hazard.

e. Ownership

The dam is owned by the Ocean County Council of The Boy Scouts of America, 33 Washington Street, Toms River, New Jersey.

f. Purpose of Dam

The dam is used for recreation purposes.

g. Design and Construction History

The dam was designed as a rolled earth embankment with a timber box drop inlet spillway by Lawrence F. Wagner P.E. #3257, Toms River, in 1956. No information regarding who did the actual construction was available.

h. Normal Operating Procedures

See Section 4

1.3 PERTINENT DATA

a. Drainage Area

The drainage area of the Mill Pond Dam is 2.36 square miles.

b. Discharge at Dam Site

No discharge records are available for this site. According to the calculations, using a 100-year flood frequency; the discharge into the reservoir would be 550 c.f.s. The combined capacity of the emergency spillway and the drop inlet is 395 c.f.s. For a 50-year flood frequency, the discharge from the reservoir would be 435 c.f.s which would also exceed the spillway capacity.

c. Elevation (M.S.L.)

Top of dam - 80.0
Maximum pool - 80.0 (top of emergency spillway)
Recreation pool - 77.0

d. Reservoir

Length of maximum pool - 2400 feet
Length of recreation pool - 1100 feet

e. Storage

Recreation Pool - 22 acre feet (maximum)
Top of dam - 40 acre feet

f. Reservoir Surface

Top of dam - 6 acres
Recreation pool - 5.5 acres
Maximum pool - 6 acres
Spillway crest - 5.5 acres

g. Dam

Type - Earth fill
Length - 250 feet
Height - 12 feet
Freeboard between normal reservoir and the top of the dam - 3 feet
Top width - 14 feet
Side slopes - 2:1
Embankment - composition and compactness unknown

h. Diversion and Regulating Tunnel

None

i. Spillway

Type - drop inlet
Crest elevation - 77.0 (drop inlet)
Length of weir - 60 feet (emergency spillway)
Emergency Spillway - El. = 79.0

j. Regulating Outlets

Batterboards on upstream end of box inlet can be raised to drain lake (see paragraph 4.2).

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

The information available for review for the Mill Dam included:

1) Dam application filed by the Ocean County New Jersey Boy Scout Council, dated July 23, 1956.

2) Drawings titled "Plan of Lakes, Boy Scout Reservation, Brookville" April 1955. These drawings consist of Elevation, Sections and Plan views of the dam and spillway. (See Figure 2 and 3).

3) U.S. Geological Survey, Brookville Quadrangle 1972.

2.2 CONSTRUCTION

No information on the original construction of the dam was obtainable. (See Paragraph 4.2).

2.3 OPERATION

See Section 4.

2.4 EVALUATION

The lack of detailed construction or as-built records render an evaluation of the stability of earthwork zoning impossible. Recommendations for additional engineering data needed for further studies are delineated in Section 7.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

The visual inspection of the Mill Dam was conducted on 14 June 1978 with a subsequent inspection made on 28 June to ascertain subsurface conditions. No records of any previous inspections were available.

b. Dam

The top of the dam is a sand and gravel forest road used only occasionally by BSA maintenance vehicles. Minor erosion has occurred at the tops of the sideslopes and in the vicinity of the crest weir near the west abutment. The upstream face is heavily silted up. The downstream face is covered with secondary growth and a few trees.

The earth embankment appears stable except for a few depressions in the road surface and minor erosion chases on the downstream face. Some minor embankment seepage was observed.

c. Appurtenant Structures

The only appurtenant structure is the timber drop inlet sluiceway. This structure was found to be in good condition although not constructed exactly as shown on the 1956 plans. Removable flashboards have been positioned on the lakefont side to assist in the drawdown operations.

d. Reservoir Area

The BSA officials stated that they lower the lake each winter by raising the drop inlet flashboards. Debris is removed as a continuing part of their maintenance, most of the work

being done by the Boy Scouts. Nothing is apparently done regarding siltation although much of it is of an organic nature. The area of the reservoir was originally a naturally occurring cranberry bog although there is evidence of old earthern dikes which maintained the bog pond elevations.

e. Downstream Channel

The channel is the natural course of Oyster Creek and for the most part remains in its original state. Some minor erosion occurs and numerous fallen logs and brush form blockages but are of no consequence.

3.2 EVALUATION

The major concerns of the inspection team were:

a. The capacity of the sluiceway and its condition.

b. The trees and brush growth on the downstream dam slopes.

c. The presence of a uncharted dam owned by others at the upper reach of the reservoir.

Futher evaluation is contained in Section 7.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

Operational procedures were not physically observed by the inspection team. Discussions with B.S.A. officials revealed that the camp maintenance crew remove debris from the drop inlet when necessary.

4.2 MAINTENANCE OF DAM

In the past few years the drop inlet structure was rebuilt and currently the emergency spillway is being reconstructed, after a recent overtopping took place.

The lake is drained annually in the autumn by lifting up the front batterboards of the drop inlet with complete drawdown requiring 5 to 7 days. Removal is performed when the water level is below the spillway crest. Removal of the batterboards during periods of heavy flow would be extremely difficult.

4.3 MAINTENANCE OF OPERATING FACILITIES

None

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

Presently the camp maintenance crew monitor the dam and surrounding area during periods of heavy flow. The area is deserted a majority of the time in winter.

4.5 EVALUATION

The recent overtopping in early June has convinced the owners to rehabilitate the emergency spillway. However, as the attached hydraulic calculations show, even with a fully operational emergency spillway, the dam will be unable to handle heavy flows. The dam and drop inlet are maintained in good working order except timber debris continually collects at the drop inlet.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data

The spillway at the Mill dam is a 6' x 5' timber box drop inlet. Additional discharge capacity is provided by an emergency crest spillway 60' in length. Maximum combined discharge through the drop inlet and over the spillway is 395 c.f.s.

The discharge into the reservoir has been calculated using the Stankowski method, for both 50-year and the 100-year frequencies. These values were 435 c.f.s. and 550 c.f.s. respectively. At the direction of the Corps of Engineers, the 100-year flood was recalculated utilizing precipitation intensities derived from Technical Paper No. 40. These values were utilized in conjunction with the HEC-1 program to determine the SDF which was subsequently routed through the lake. The resulting 100-year flood inflow of 671 c.f.s. exhibited no decrease in the discharge after routing. This was attributed to the size of the lake and its storage capacity. Based on the HEC-1 program, the spillway capacity is capable of accommodating approximately 44% of the SDF (100-year).

b. Historical Data

The dam was originally designed using the Low South Jersey Curve run-off which was established as the 15-year flood in this area. A 50-year flood was estimated by the original designer at 117% of the Low South Jersey Curve. This gave a design discharge of 216 c.f.s. In light of current procedures, this is a very low value and thought to be inadequate.

c. Visual Observations

There was little damage from overtopping although the emergency spillway, prior to the present reconstruction, appeared only as an ill-defined depression in the roadway at the dam crest. Moreover, it is believed that the dam is periodically overtopped but this was not evidenced by any serious erosion or washouts. The drop inlet is easily blocked up.

d. Overtopping Potential

Employing the discharge and spillway capacities, overtopping would occur in the event of a storm of either 50-year or 100-year frequency. Since the SDF exceeds the spillway capacity, the overtopping potential of the SDF was determined by calculating the overbank discharge. In this manner it was determined that the SDF would overtop the dam by approximately one-half foot. In addition, the exact hydraulic effectiveness of the emergency spillway is questionable until such time as the present reconstruction is completed. The attached hydraulic calculations are based on the assumption that the spillway will be reconstructed to the dimensions of the original design plans.

e. Drawdown

Although the lake is drained every winter, the process is slow and would not be applicable, if at all possible, as an emergency drawdown procedure during periods of high water.

In the fall of the year when the lake water level is low, batterboards are removed from the spillway's drop inlet and the lake is allowed to drain, a process which takes 5 to 7 days to accomplish. During periods of high water, it would appear to be extremely hazardous to attempt removal of the batter-boards. The small increase in the discharge capacity attributable thereto would not seem to warrant the risk.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations and Data Review

The wood box drop inlet and exposed portions of the timber sheeting appear to be in good to excellent condition. There is some splitting of the timber members but no serious structural deterioration was noted although some repairs and modifications have been made to the inlet structure when it was compared to the original engineering drawings. The timber sheeting alignment appears true and no evidence was noted of tieback failure.

The proposed concrete culvert outfall is not constructed in accordance with the 1956 plans contained in the Appendix. Some erosion of the outfall channel was also noted but does not diminish the structural integrity.

The earth embankment appears to be in fair condition although portions of the downstream slopes are covered with brush and a few moderate size oak trees are growing in the lower portions. This creates a potential seepage problem since the root systems could provide pathways for piping action. There was some slight evidence of some seepage at the time of the inspection. It must be noted however, that the inspection was made during an extremely wet period.

Minor sloughing of the tops of the embankment slopes was noted but it is not of a serious nature. The downstream face of the dam has an ill-defined 2:1 slope in the vicinity of the sluiceway and flattens out to approximately 3:1 near the ends of the dam. The normal head differential of 8.5 feet creates a minimum seepage path in excess of thirty feet; hence the embankment has performed satisfactorily since the reconstruction period over 20 years

ago. Judging from the size of the trees on the older portions, the remainder of the embankment is considerably older.

Inasmuch as the normal operational drawdown period exceeds 5 days, there is little danger of an ensuing embankment shear failure on the upstream face. Moreover this face appears to be quite heavily silted up although it was completely submerged to sluiceway crest at the time of inspection.

The placement area of the dam appears to be on fill overlying a marine stratified material consisting of silty sands grading to uniform fine sands, usually greater than ten feet in depth. There are indications that the groundwater table is at a shallow depth and the surface drainage conditions are poor to very poor.

An underlying formation to the silty sands has not been delineated, however the underlying material in Ocean County is primarily unconsolidated, stratified, marine deposits of gravel, sand, silt and clay. The depth to bedrock has been indicated as greater than 100 feet throughout the entire area.

b. Seismic Stability

As the dam is located in Seismic Zone 1, only a minor hazard exists from earthquake forces. The potential vulnerability is negligible regarding this aspect as employing conventional design procedures and accepted factors of safety, the inertial forces produce a spectra of non-critical loadings.

SECTION 7 - ASSESSMENTS/RECOMMENDATIONS/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Conditions

On the basis of the Phase I visual examination, the earth embankment appears to be adequate although the spillway is capable of passing only 44% of the SDF. There does not appear to have been any serious erosion due to previous overtoppings of the dam. The dam appears to be stable although the hydraulic review would indicate that the spillway capacity should be increased to preclude further uncontrolled overtopping.

b. Adequacy of Information

The hydraulic data employed in the original 1956 computations is inadequate when compared to current procedures dictated by Corps of Engineers directives and therefore was not used in the appended hydraulic analysis. The original design plans filed with the 1956 dam application permit were of value where they were dimensionally accurate.

Although it is not recommended herein, if further studies be undertaken, additional information required should include:

1) Soil borings, material classification of the embankment and affected strata of the underlying clay-sands, plus geotechnical tests to evaluate certain requisite soil properties such as density and permeability.

2) Piezometric readings in all embankment zones.

3) As-built plans or physical measurements of the crest weir presently under construction and the outlet of the culvert spillway.

c. Urgency

Due to the low hazard classification of the dam and the fact that little property damage is likely in the case of a failure, the enlarging of the drop inlet spillway capacity is not warranted. As a result of the inspection and the fact that the Boy Scout officials are presently rebuilding the crest spillway, the remedial actions recommended below should be undertaken in the near future as the lake will be drawn down over the coming winter months.

d. Necessity for Further Study

Additional engineering investigations are deemed to be unnecessary.

7.2 RECOMMENDATIONS/REMEDIAL MEASURES

It is recommended that no further action be considered at this dam except for the continued periodic inspection by New Jersey Division of Water Resources personnel.

a. Alternatives

- The aforementioned reconstruction of the crest overflow spillway presently being undertaken by the owners should be inspected.
- The removal of the root systems of trees and brush to eliminate potential seepage channels.
- Repair and stabilization of the tops of the embankment slopes where minor erosion has occurred.

b. O&M Maintenance and Procedures

No additional procedures appear to be warranted in light of the above assessment and present program.

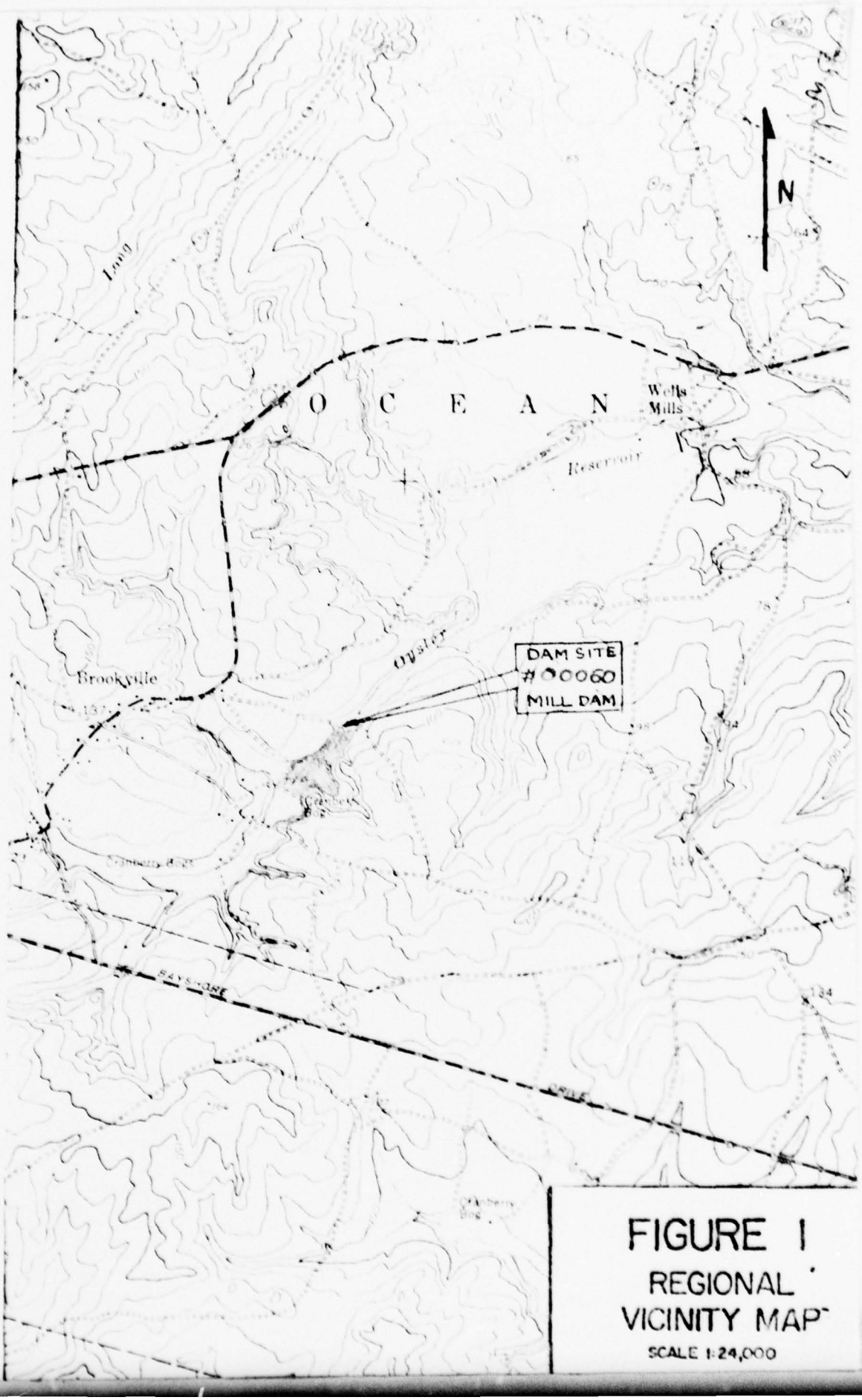
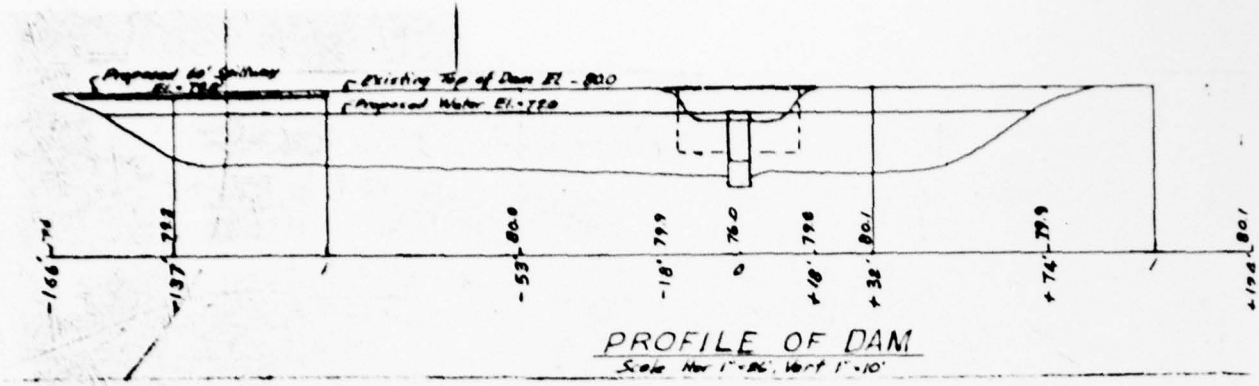


FIGURE 1

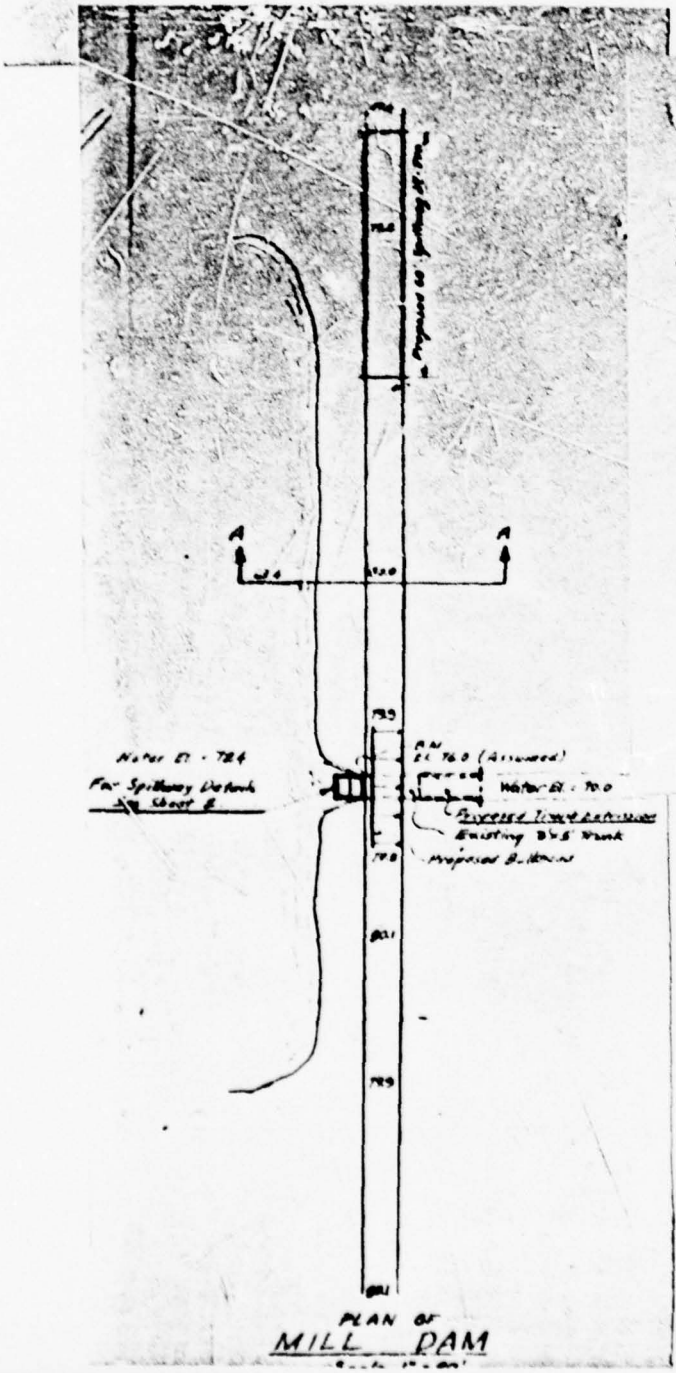
REGIONAL VICINITY MAP

SCALE 1:24,000

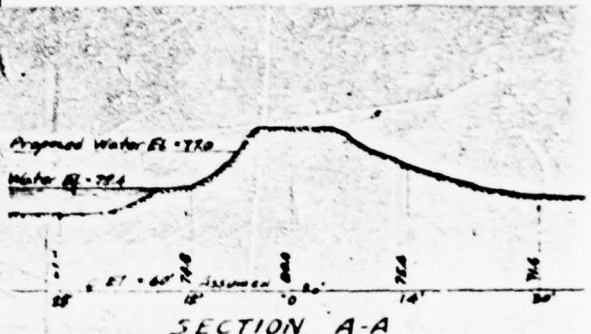


PROFILE OF DAM

Scale Hor 1" = 80', Vert 1" = 10'

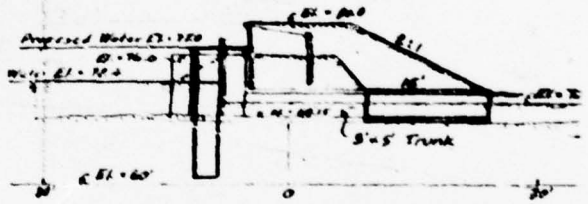


PLAN OF MILL DAM



SECTION A-A

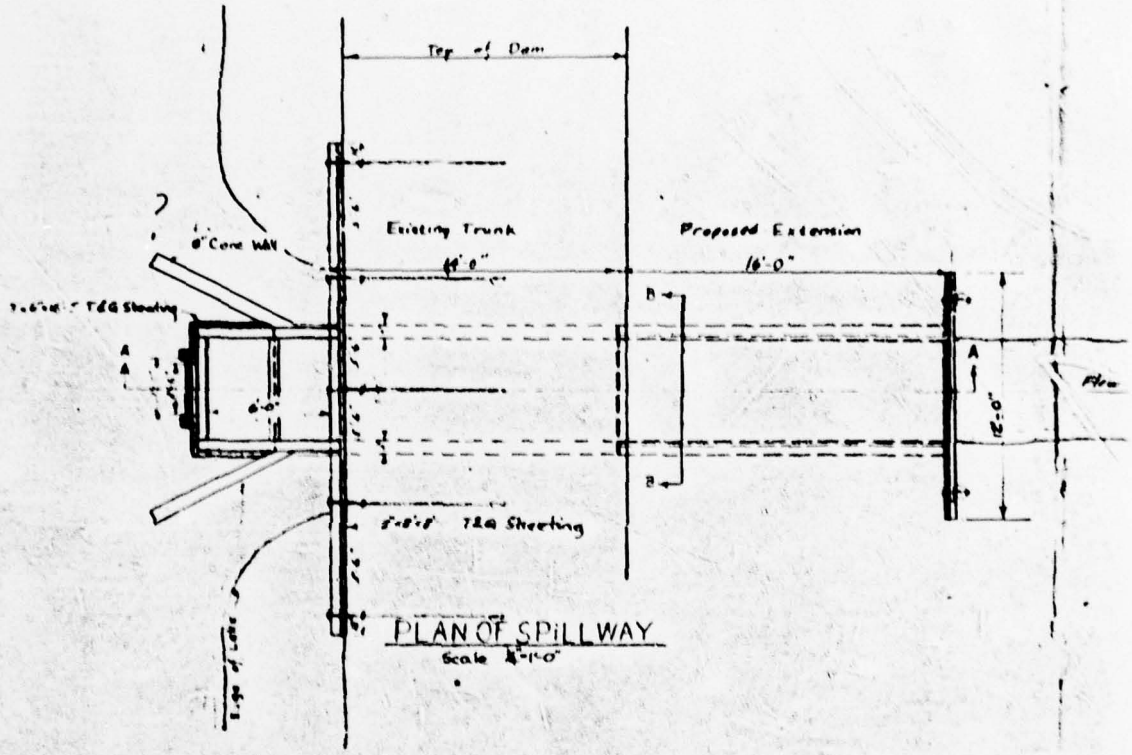
Scale 1" = 10'



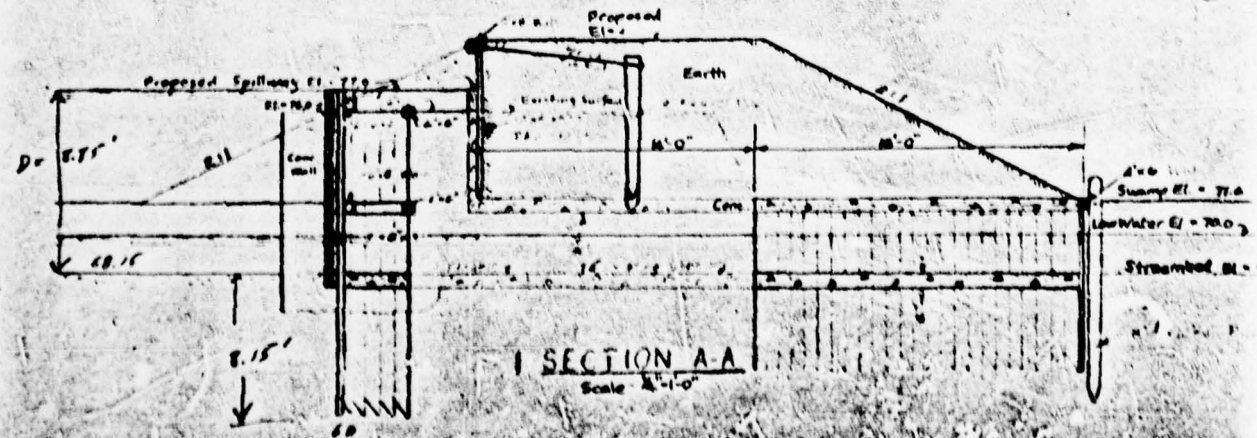
SECTION OF SPILLWAY

Scale 1" = 10'

FIGURE 2



PLAN OF SPILLWAY
Scale 1/4"=1'-0"



SECTION A-A
Scale 1/4"=1'-0"

FIGURE 3

Check List
Visual Inspection
Phase 1

Name Dam Mill Dam County Ocean State New Jersey Coordinators NJDEP

Date(s) Inspection 6/14/78 Weather Rain Temperature 75°F

Pool Elevation at Time of Inspection 77.3 M.S.L. Tailwater at Time of Inspection 70± M.S.L.

Inspection Personnel:

T. Chapter

M. Carter

K. Jolls

K. Jolls Recorder

CONCRETE/MASONRY DAMS SHEET 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEEPAGE OR LEAKAGE		
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS		Plans available
DRAINS	None visible	
WATER PASSAGES	None	
FOUNDATION	Sheeting in front face (timber)	In area of 1956 reconstruction

CONCRETE/MASONRY DAMS SHEET 3

VISUAL EXAMINATION OF	OBERSVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N/A	
STRUCTURAL CRACKING	N/A	
VERTICAL AND HORIZONTAL ALIGNMENT	N/A	
MONOLITH JOINTS	N/A	
CONSTRUCTION JOINTS	N/A	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	Minor observed	At tops of slopes
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Only at top of berm. Embankment appears satisfactory.	Several trees on embankment
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	Satisfactory	
RIPRAP FAILURES	None	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Abutments ill-defined due to age of embankment.	Plans indicate abutment position much farther back than field evidence indicates.
ANY NOTICEABLE SEEPAGE	Slight	
STAFF GAGE AND RECORDER	None	
DRAINS	None	Evidence of old notch in dam crest.

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	N/A	
INTAKE STRUCTURE	Wood Sheeting (6 x 5 ±)	Plans available
OUTLET STRUCTURE	Ok (box culvert)	Minor cracking
OUTLET CHANNEL	Ill-defined	Channel uncontrolled
EMERGENCY GATE	None	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	None	
APPROACH CHANNEL	None	
DISCHARGE CHANNEL	Natural streambed	Drift and debris
BRIDGE AND PIERS	None	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	N/A	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A	
BRIDGE AND PIERS	N/A	
GATES AND OPERATION EQUIPMENT	N/A	

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER		

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Flat/artificial lake created from Cranberry bogs.	Average depth 4'±
SEDIMENTATION	Yes	Lake drained in winter by BSA.

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Natural Creek Some debris and drift	Overtopping flow would flow into Wells Mills Reservoir.
SLOPES	Flat	
APPROXIMATE NO. OF HOMES AND POPULATION	None	

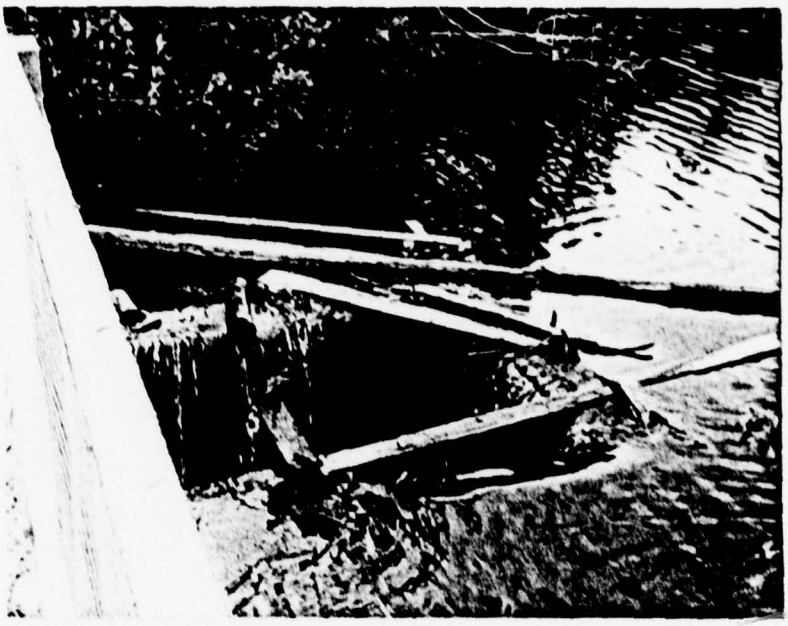
CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	Available for box inlet structure.
REGIONAL VICINITY MAP	Available
CONSTRUCTION HISTORY	Unknown
TYPICAL SECTIONS OF DAM	Unavailable
HYDROLOGIC/HYDRAULIC DATA	Not available
OUTLETS - PLAN	Available
- DETAILS	Available
-CONSTRAINTS -DISCHARGE RATINGS	- Available
RAINFALL/RESERVOIR RECORDS	Not available

ITEM	REMARKS
DESIGN REPORTS	None available
GEOLOGY REPORTS	Not available
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Not available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Not available
POST-CONSTRUCTION SURVEYS OF DAM	None available
BORROW SOURCES.	Unknown

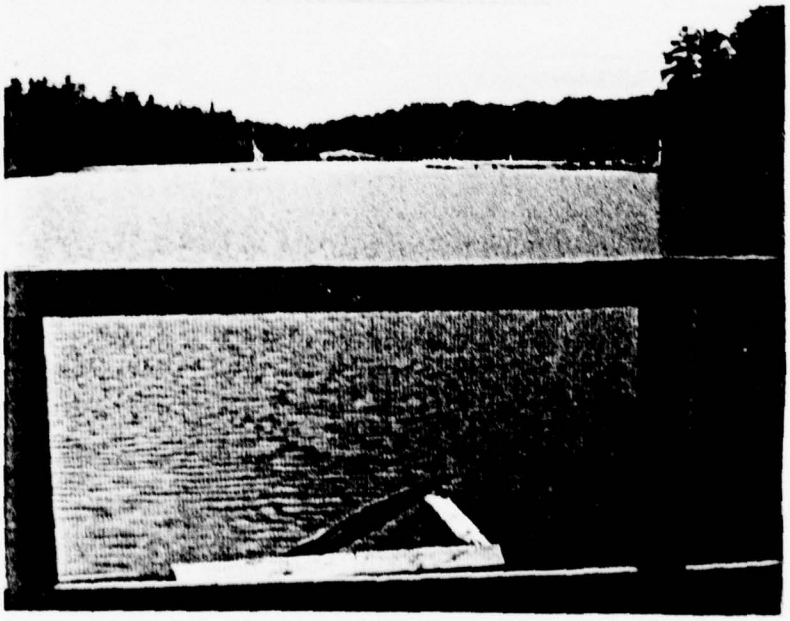
ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	Rehabilitation of overflow spillway summer 1978
HIGH POOL RECORDS	None available
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Not available
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION	Spring 1978 Overtopping
REPORTS	None
MAINTENANCE OPERATION RECORDS	None available

ITEM	REMARKS
SPILLWAY PLAN	Available
SECTIONS	Available
DETAILS	Available
OPERATING EQUIPMENT PLANS & DETAILS	N/A



Spillway

June 1978



View of Lake

June 1978

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 2.36 sq.mi.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 77.0 (22 acre-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 80.0 (40 acre-ft.)

ELEVATION MAXIMUM DESIGN POOL: 79.0

ELEVATION TOP DAM: 80.0

CREST:

a. Elevation 77.0
b. Type Timber box drop inlet
c. Width 5 ft.
d. Length 6 ft.
e. Location Spillover Center of dam
f. Number and Type of Gates ---

OUTLET WORKS:

a. Type overflow weir
b. Location 100' from east end
c. Entrance inverts 79.0'
d. Exit inverts 79.0'
e. Emergency draindown facilities Raising of stop planks on drop inlet

HYDROMETEOROLOGICAL GAGES: None
a. Type
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 395 cfs

BY D.J.M. DATE ____ CHKD. BY ____ DATE ____ SUBJECT ____

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. A1 OF A11
PROJECT C323
MILL POND DAM INSPECTION
Precipitation Data (USED IN HEC1 INPUT)

Data from T.P. 40 (See Curve A3) — 100 year event

	Time	Rainfall	Δ	Rearrange Δ	Cumulative Δ	Runoff Curve 60	Δ
	0	0					
1	0.5	2.75	2.75	0.11	0.11	0	
	1.0	3.30	0.55	0.17	0.28	0	
2	1.5	3.71	0.41	0.18	0.41	0	
	2.0	4.04	0.33	0.22	0.63	0	
3	2.5	4.30	0.26	0.33	0.96	0	
	3.0	4.50	0.20	0.41	1.37	0	
4	3.5	4.72	0.22	0.55	1.92	0.05	0.05
	4.0	4.90	0.18	2.75	4.67	1.12	1.07
5	4.5	5.04	0.14	0.26	4.87	1.24	0.12
	5.0	5.17	0.13	0.20	5.13	1.40	0.16
6	5.5	5.29	0.12	0.14	5.26	1.45	0.05
	6.0	5.40	0.11	0.13	5.40	1.55	0.10

Time of concentration

Method 1

$L = 3.15$ miles $H = 89$ feet

$$T_c = \left(\frac{11.9 \times 3.15^3}{89}\right)^{0.385} = 1.73 \text{ hours}$$

Method 2 (U.S. NAVY) & (Texas Highway department)

Slope of overland area $L = 1.41$ miles. $H = 29'$

$$S = \frac{29 \times 100}{1.41 \times 5280} \triangleq 0.4\% \text{ gives } V = 1.0 \text{ ft/s}$$

$$T = 1.41 \times 5280 \div 3600 = 2.07 \text{ hours}$$

Slope of water course $L = 1.65$ miles $H = 60'$

$$S = \frac{60 \times 100}{1.65\ 5280} = 0.7\% \text{ gives } V \approx 2.0 \text{ ft/s}$$

Gives $T = \frac{170 \times 5280}{2 \times 8600} = 1.25$ hours

T_c = combined watercourse & overland flow = 2.07 + 1.25

Gives T_c = 3.32 hours

$T_p = 0.25 + 0.6 \times 3.32$

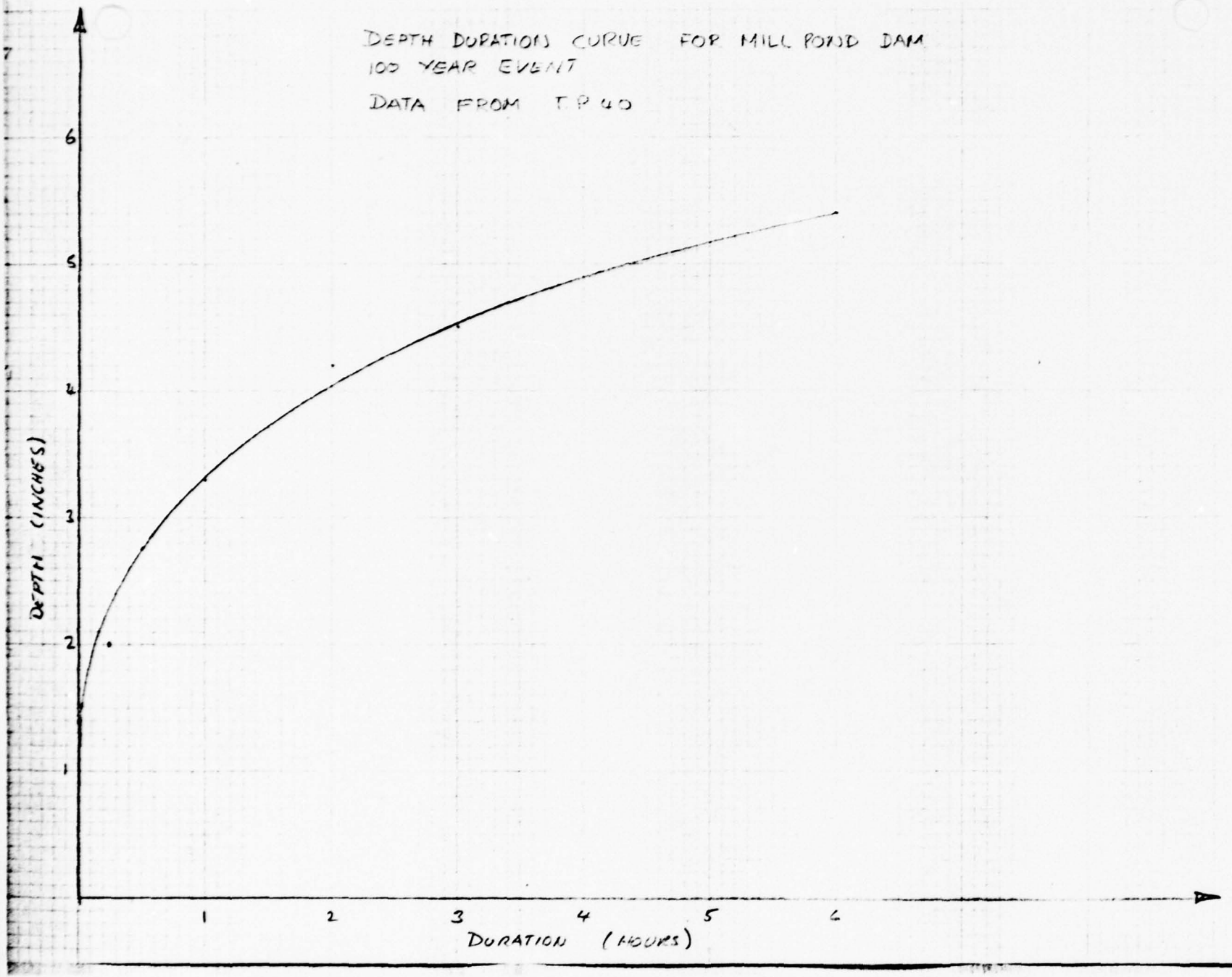
$= 2.24$ hours

$T_s = Lag + \frac{D}{2}$

Bureau of rec lag $= \frac{T_p}{0.85} - \frac{D}{2} = 2.64 - \frac{D}{2}$ $(= 2.39)$

$\therefore T_s = \left(2.64 - \frac{D}{2}\right) + \frac{D}{2} = 2.64$ hours

DEPTH DURATION CURVE FOR MILL POND DAM
100 YEAR EVENT
DATA FROM T.P 40



11 of 43

BY H. G. DATE

CHKD. BY DATE

SUBJECT BUREAU OF RECLAMATION DEFINITION OF TERMS USED IN UNITGRAPH

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. A4 OF 1

PROJECT C222

L, LAG TIME AS DEFINED BY THE SCS IS THE TIME IN HOURS FROM THE MIDPOINT OF EXCESS RAINFALL, TO THE TIME OF PEAK DISCHARGE.

L, LAG TIME AS DEFINED BY THE BUREAU OF RECLAMATION IS FROM THE CENTRE OF MASS OF RAINFALL TO THE CENTER OF MASS OF RUNOFF.

T_c IS EQUAL TO $\left(\frac{11.9\,L^3}{H}\right)^{0.385}$ FROM THE CALIFORNIA CULVERTS PRACTICE

SCS L IS APPROXIMATELY 0.6 T_c

EXAMPLES OF DETERMINING L (LAG) BY BUREAU OF RECLAMATION DEFINITION,

$$L = \frac{T_p - (D/2)}{0.85}$$ WHERE D IS THE TIME INTERVAL OF THE UNITGRAPH

THE SCS CURVELINEAR UNIT HYDROGRAPH CAN BE DERIVED BY FIRST TAKING BUREAU OF RECLAMATION L, (LAG) PLUS $\frac{D}{2}$ AFTER BEING DIVIDED BY 100, THEN MULTIPLIED BY EACH ABSCISSA (IN HOURS) BY THE QUOTIENT. THEN READING THE DIMENSIONLESS ORDINATE FOR THE GIVEN PERCENTAGES FROM THE PREVIOUSLY DETERMINED SCS CURVELINEAR DIMENSIONLESS GRAPH, (COPY ATTACHED)

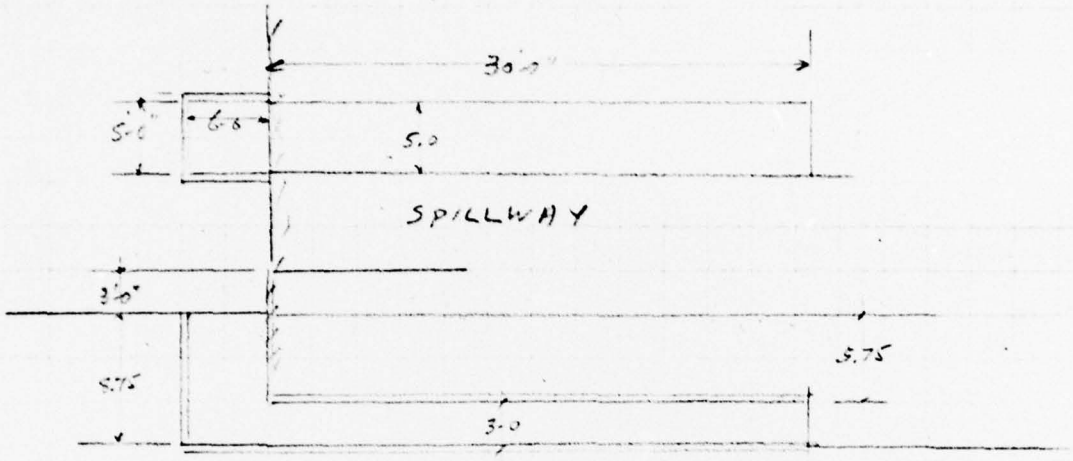
TO OBTAIN Q IN CFS FOR EACH ORDINATE MULTIPLY EACH DIMENSIONLESS ORDINATE BY A FACTOR OBSERVED FOR ONE INCH,

26.89 × AREA

BY C.H. DATE 7-6-76 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. A 5 OF A11

CHKD. BY DATE DAM INSPECTION PROJECT C222

SUBJECT MILL POND (BSA) CALCULATION OF SPILLWAY CAPACITY



Crest control L = 17' C = from 3.0 @ 0.5' to 2.7 @ 3.0'

H.	C	Q
0.5	3.0	18
1.0	3.0	51
1.5	2.8	92
2.0	2.9	139
2.5	2.8	188
3.0	2.7	239
4.0	2.7	367 (assuming 1 foot overtopping)

Emergency Spillway L = 60'

H	e	Q
0.5	2.5	53
1.0	2.6	156
2.0	2.7	458

(assuming 1 foot overtopping

BY D.J.M DATE 8-78 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. A6 OF
CHKD. BY DATE MILL POND DAM INSPECTION PROJECT C222
SUBJECT

Assuming overtopping of 1 foot over the entire length of dam

$C = \pm 2.5$

$L = 190$ feet (dam)

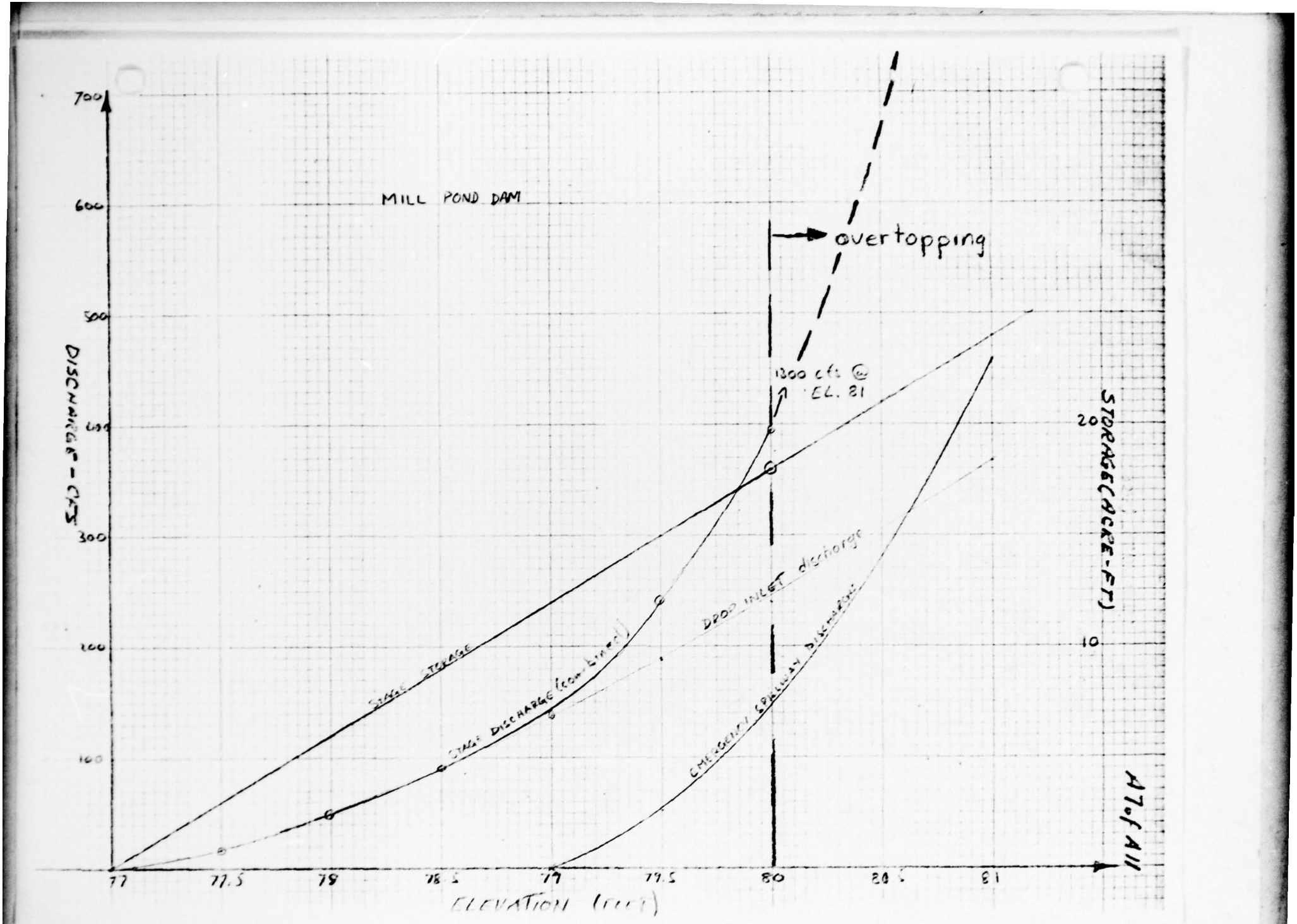
$H = 1.0$

$Q = 475$ C fs.

Summary (combined discharges)

Head (Datum El 77)	discharge cfs	Storage* Acre feet	
0	0	0	
0.5	18	3	
1.0	51	6	
1.5	92	9	
2.0	139	12	
2.5	241	15	
3.0	395	18	(Top of Dam)
4.0	1300	24	

* Assumes constant water surface area with increasing elevation due to small elevation change to top of dam.


MILL POND DAM
overtopping
1200 cfs @ EL. 81
DISCHARGE - CFS
STORAGE (ACRE-FT)
700
600
500
400
300
200
100
20
10
SINGLE STORAGE
SINGLE DISCHARGE (from Lines)
DROP INLET discharge
EMERGENCY SPILLWAY DISCHARGE
77
77.5
78
78.5
79
79.5
80
80.5
81
ELEVATION (FEET)
AT of AH

(10-55)
Bureau of Reclamation

A 8

DERIVATION OF DIMENSIONLESS OR APPLIED UNITGRAPH

Unitgraph {derived from / for application of} MILL POND DAM

Unit time, t_g = 0.5 hrs. t_{lag} = 2.39 hrs. $t_p = t_{lag} + \frac{1}{2} t_g$ = 2.64

Area = 2.36 sq. mi. DSF {observed / for 1 inch, = 26.89 X area} 63.46

Comp. by _____ Ck. by _____ Date _____

Hours	$\frac{t_g}{\left(\frac{100}{t_g} = 3789\right)}$	Dimensionless ordinate $Q \frac{t_g}{DSF}$	Q cfs $\left(\frac{DSF}{t_g}\right)$		Inverted Q cfs
0.5	18.95	1.6	38		
1.0	37.90	7.2	173		
1.5	56.85	15.2	365		
2.0	75.80	20.3	487		
2.5	94.75	20.3	487		
3.0	113.70	16.9	406		
3.5	132.65	12.6	302		
4.0	151.60	9.3	223		
4.5	170.55	6.7	161		
5.0	189.50	4.85	116		
5.5	208.45	3.45	83		
6.0	227.40	2.45	59		
6.5	246.35	1.73	42		
7.0	265.30	1.22	29		
7.5	284.25	0.88	21		
8.0	303.20	0.63	15		
8.5	322.15	0.45	11		
9.0	341.10	0.35	8		
9.5	360.05	0.25	6		
10.0	379.00	0.19	5		
10.5	397.95	0.16	4		
11.0	416.90	0.13	3		

BY H. G. DATE

CKD. BY DATE

SUBJECT BUREAU OF RECLAMATIONAL DEFINITION OF TERMS USED IN UNITGRAPH

LOUIS BERGER & ASSOCIATES INC.

SHEET NO. A9 OF A11

PROJECT C222

L, LAG TIME AS DEFINED BY THE SCS IS THE TIME IN HOURS FROM THE MIDPOINT OF EXCESS RAINFALL, TO THE TIME OF PEAK DISCHARGE.

L, LAG TIME AS DEFINED BY THE BUREAU OF RECLAMATION IS FROM THE CENTER OF MASS OF RAINFALL TO THE CENTER OF MASS OF RUNOFF.

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TO OBTAIN Q IN CFS FOR EACH ORDINATE MULTIPLY EACH DIMENSIONLESS ORDINATE BY A FACTOR OBSERVED FOR ONE INCH,

$$26.89 \times \text{AREA}$$

SCS Curvilinear Dimensionless Graph no. 1

%	0	1	2	3	4	5	6	7	8	9
0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4
10	0.4	0.5	0.6	0.7	0.9	1.0	1.2	1.3	1.4	1.6
20	1.8	2.0	2.2	2.5	2.8	3.1	3.3	3.6	3.9	4.2
30	4.5	4.8	5.1	5.4	5.8	6.2	6.5	6.9	7.2	7.6
40	8.0	8.4	8.8	9.2	9.6	10.0	10.4	10.8	11.3	11.7
50	12.2	12.6	13.1	13.5	14.0	14.5	14.9	15.2	15.6	16.0
60	16.4	16.7	17.0	17.3	17.7	18.0	18.2	18.5	18.7	19.0
70	19.2	19.4	19.6	19.9	20.0	20.2	20.3	20.4	20.5	20.7
80	20.8	20.8	20.9	20.9	21.0	21.0	20.9	20.9	20.8	20.8
90	20.7	20.6	20.5	20.5	20.4	20.3	20.2	20.1	20.0	19.9
100	19.8	19.6	19.4	19.2	19.1	18.9	18.7	18.5	18.3	18.1
110	17.9	17.6	17.4	17.1	16.9	16.6	16.4	16.2	16.0	15.7
120	15.5	15.2	15.0	14.7	14.5	14.2	14.0	13.8	13.6	13.4
130	13.2	13.0	12.8	12.6	12.4	12.2	12.0	11.8	11.6	11.5
140	11.3	11.1	10.9	10.7	10.5	10.4	10.2	10.0	9.9	9.8
150	9.6	9.4	9.3	9.1	9.0	8.8	8.7	8.5	8.4	8.2
160	8.1	8.0	7.8	7.7	7.5	7.4	7.3	7.2	7.0	6.9
170	6.8	6.7	6.6	6.5	6.4	6.2	6.1	6.0	5.9	5.8
180	5.7	5.6	5.5	5.4	5.3	5.2	5.1	5.0	5.0	4.9
190	4.8	4.7	4.6	4.6	4.5	4.4	4.3	4.2	4.2	4.1
200	4.0	3.9	3.8	3.8	3.7	3.6	3.6	3.5	3.4	3.4
210	3.3	3.2	3.2	3.1	3.1	3.0	3.0	2.9	2.8	2.8
220	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.4	2.3
230	2.3	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	1.9
240	1.9	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.6
250	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.3
260	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1
270	1.1	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9
280	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7
290	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6
300	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5
310	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4
320	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
330	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
340	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2
350	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
360	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
370	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
380	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
390	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
400	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
410	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
420	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
430	0.1	0.1	0.1	0.0						

BY T.C DATE 7-6-78 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. A11 OF A11
CHKD. BY D.M DATE 7-7-78 DAM INSPECTION PROJECT G-222
SUBJECT MILL POND DAM N.S.A.I

CALCULATION OF DISCHARGE BY STANKOWSKI METHOD.

$$Q_{50} = 104\ A^{0.85} \times S^{0.26} \times St^{-0.51} \times I^{0.16}$$

$$Q_{100} = 136\ A^{0.84} \times S^{0.26} \times St^{-0.51} \times I^{0.16}$$

Where:

A = drainage area = 2.36 Square miles

S = Slope = 27 feet/mile

St = Surface storage Index = 2%

I = Impervious cover = 3.5%

Gives

$Q_{50 years} = 104 \times 2.36^{0.85} \times 27^{0.26} \times 2^{-0.51} \times 3.5^{0.16}$

$= 104 \times 2.07 \times 2.36 \times 0.7 \times 1.22$

$= \underline{434\ cfs}$

$Q_{100 years} = 136 \times 2.36^{0.84} \times 27^{0.26} \times 2^{-0.51} \times 3.5^{0.16}$

$= 136 \times 2.06 \times 2.36 \times 0.7 \times 1.19$

$= \underline{550\ cfs}$

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**********
HEC-1 VERSION DATED JAN 1973
UPDATED AUG 74
CHANGE NO. 01
**********
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MILL POND DAM INSPECTION
BY D.J.MULLIGAN
WEDNESDAY AUGUST 2ND 1978

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
50	0	30	0	0	0	0	0	0	0

JOPER	NWT
3	0

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH (100-YEAR FREQUENCY EVENT)

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
4	0	0	0	2	0	1

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
0	-1	2.36	0.0	2.36	0.0	0.0	0	0	0

PRECIP DATA

NP	STORM	DAJ	DAK
12	0.0	0.0	0.0

PRECIP PATTERN

0.0	0.0	0.0	0.0	0.0	0.0	0.05	1.07	0.12	0.16
0.05	0.10								

LOSS DATA

STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0.0	0.0	1.00	0.0	0.0	1.00	0.0	0.0	0.0	0.0

GIVEN UNIT GRAPH. NUHGG= 22

38.	173.	765.	487.	487.	406.	302.	223.	161.	115.
87.	59.	42.	29.	21.	15.	11.	8.	6.	5.
4.	3.								

UNIT GRAPH TOTALS 3044. CFS OR 1.00 INCHES OVER THE AREA

RECESSION DATA

STRTQ= 0.0 QRCSN= 0.0 RTIOR= 1.00

END-OF-PERIOD FLOW

TIME	RAIN	EXCS	COMP Q
1	0.0	0.0	0.
2	0.0	0.0	0.
3	0.0	0.0	0.
4	0.0	0.0	0.
5	0.0	0.0	0.
6	0.0	0.0	0.
7	0.05	0.05	2.
8	1.07	1.07	49.
9	0.12	0.12	208.

10	0.16	0.16	442.
11	0.05	0.05	619.
12	0.10	0.10	671.
13	0.0	0.0	621.
14	0.0	0.0	522.
15	0.0	0.0	421.
16	0.0	0.0	322.
17	0.0	0.0	239.
18	0.0	0.0	173.
19	0.0	0.0	124.
20	0.0	0.0	89.
21	0.0	0.0	62.
22	0.0	0.0	45.
23	0.0	0.0	32.
24	0.0	0.0	23.
25	0.0	0.0	17.
26	0.0	0.0	12.
27	0.0	0.0	10.
28	0.0	0.0	7.
29	0.0	0.0	5.
30	0.0	0.0	2.
31	0.0	0.0	1.
32	0.0	0.0	1.
33	0.0	0.0	0.
34	0.0	0.0	0.
35	0.0	0.0	0.
36	0.0	0.0	0.
37	0.0	0.0	0.
38	0.0	0.0	0.
39	0.0	0.0	0.
40	0.0	0.0	0.
41	0.0	0.0	0.
42	0.0	0.0	0.
43	0.0	0.0	0.
44	0.0	0.0	0.
45	0.0	0.0	0.
46	0.0	0.0	0.
47	0.0	0.0	0.
48	0.0	0.0	0.
49	0.0	0.0	0.
50	0.0	0.0	0.
SUM	1.55	1.55	4720.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	671.	371.	98.	34.	4718.
INCHES		1.46	1.55	1.55	1.55
AC-FT		184.	195.	195.	195.

•OVF•

STATION 4

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

0.	100.	200.	300.	400.	500.	600.	700.	0.	0.	0.	0.	0.
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	PRECIP(L) AND EXCESS(X) 0.8	0.4	0.0
1	I	.	.	.	.	.	.	.	.	.	.	.	.	L
2	I	.	.	.	.	.	.	.	.	.	.	.	.	L
3	I	.	.	.	.	.	.	.	.	.	.	.	.	L
4	I	.	.	.	.	.	.	.	.	.	.	.	.	L
5	I	.	.	.	.	.	.	.	.	.	.	.	.	L
6	I	.	.	.	.	.	.	.	.	.	.	.	.	L
7	I	.	.	.	.	.	.	.	.	.	.	.	.	LX
8	.	I	.	.	.	.	.	.	.	.	LXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
9	.	.	.	I	.	.	.	.	.	.	.	.	.	LXXX
10	.	.	.	.	.	I	.	.	.	.	.	.	.	LXXXX
11	.	.	.	.	.	.	I	.	.	.	.	.	.	LX
12	.	.	.	.	.	.	.	I	.	.	.	.	.	LXXX
13	.	.	.	.	.	.	I	.	.	.	.	.	.	L
14	.	.	.	.	.	I	.	.	.	.	.	.	.	L
15	.	.	.	.	I	.	.	.	.	.	.	.	.	L
16	.	.	.	I	.	.	.	.	.	.	.	.	.	L
17	.	.	I	.	.	.	.	.	.	.	.	.	.	L
18	.	I	.	.	.	.	.	.	.	.	.	.	.	L
19	.	. I	.	.	.	.	.	.	.	.	.	.	.	L
20	.	I.	.	.	.	.	.	.	.	.	.	.	.	L
21	. I	.	.	.	.	.	.	.	.	.	.	.	.	L
22	. I	.	.	.	.	.	.	.	.	.	.	.	.	L
23	. I	.	.	.	.	.	.	.	.	.	.	.	.	L
24	. I	.	.	.	.	.	.	.	.	.	.	.	.	L
25	. I	.	.	.	.	.	.	.	.	.	.	.	.	L
26	.I	.	.	.	.	.	.	.	.	.	.	.	.	L
27	.I	.	.	.	.	.	.	.	.	.	.	.	.	L
28	.I	.	.	.	.	.	.	.	.	.	.	.	.	L
29	.I	.	.	.	.	.	.	.	.	.	.	.	.	L
30	I	.	.	.	.	.	.	.	.	.	.	.	.	L
31	I	.	.	.	.	.	.	.	.	.	.	.	.	L
32	I	.	.	.	.	.	.	.	.	.	.	.	.	L
33	I	.	.	.	.	.	.	.	.	.	.	.	.	L
34	I	.	.	.	.	.	.	.	.	.	.	.	.	L
35	I	.	.	.	.	.	.	.	.	.	.	.	.	L
36	I	.	.	.	.	.	.	.	.	.	.	.	.	L
37	I	.	.	.	.	.	.	.	.	.	.	.	.	L
38	I	.	.	.	.	.	.	.	.	.	.	.	.	L
39	I	.	.	.	.	.	.	.	.	.	.	.	.	L
40	I	.	.	.	.	.	.	.	.	.	.	.	.	L
41	I	.	.	.	.	.	.	.	.	.	.	.	.	L
42	I	.	.	.	.	.	.	.	.	.	.	.	.	L
43	I	.	.	.	.	.	.	.	.	.	.	.	.	L
44	I	.	.	.	.	.	.	.	.	.	.	.	.	L
45	I	.	.	.	.	.	.	.	.	.	.	.	.	L
46	I	.	.	.	.	.	.	.	.	.	.	.	.	L
47	I	.	.	.	.	.	.	.	.	.	.	.	.	L
48	I	.	.	.	.	.	.	.	.	.	.	.	.	L
49	I	.	.	.	.	.	.	.	.	.	.	.	.	L
50	I	.	.	.	.	.	.	.	.	.	.	.	.	L

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HYDROGRAPH ROUTING

FLOOD ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
44	1	0	0	2	0	1

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	-1.

STORAGE=	0.	3.	6.	9.	12.	15.	18.	24.	0.	0.
OUTFLOW=	0.	18.	51.	92.	139.	241.	395.	1300.	0.	0.

TIME	EOP STOR	AVG IN	EOP OUT
1	0.	0.	0.
2	0.	0.	0.
3	0.	0.	0.
4	0.	0.	0.
5	0.	0.	0.
6	0.	0.	0.
7	0.	1.	0.
8	1.	25.	6.
9	5.	129.	43.
10	14.	325.	198.
11	19.	530.	593.
12	20.	645.	672.
13	20.	646.	633.
14	19.	572.	540.
15	18.	471.	436.
16	17.	372.	357.
17	16.	281.	278.
18	14.	206.	211.
19	13.	148.	159.
20	11.	106.	125.
21	10.	75.	101.
22	8.	53.	79.
23	7.	38.	61.
24	6.	27.	47.
25	5.	20.	37.
26	4.	14.	29.
27	3.	11.	22.
28	3.	9.	17.
29	3.	7.	15.
30	2.	4.	13.
31	2.	2.	10.
32	1.	1.	8.
33	1.	0.	6.
34	1.	0.	5.
35	1.	0.	4.
36	1.	0.	3.
37	0.	0.	2.
38	0.	0.	2.
39	0.	0.	1.

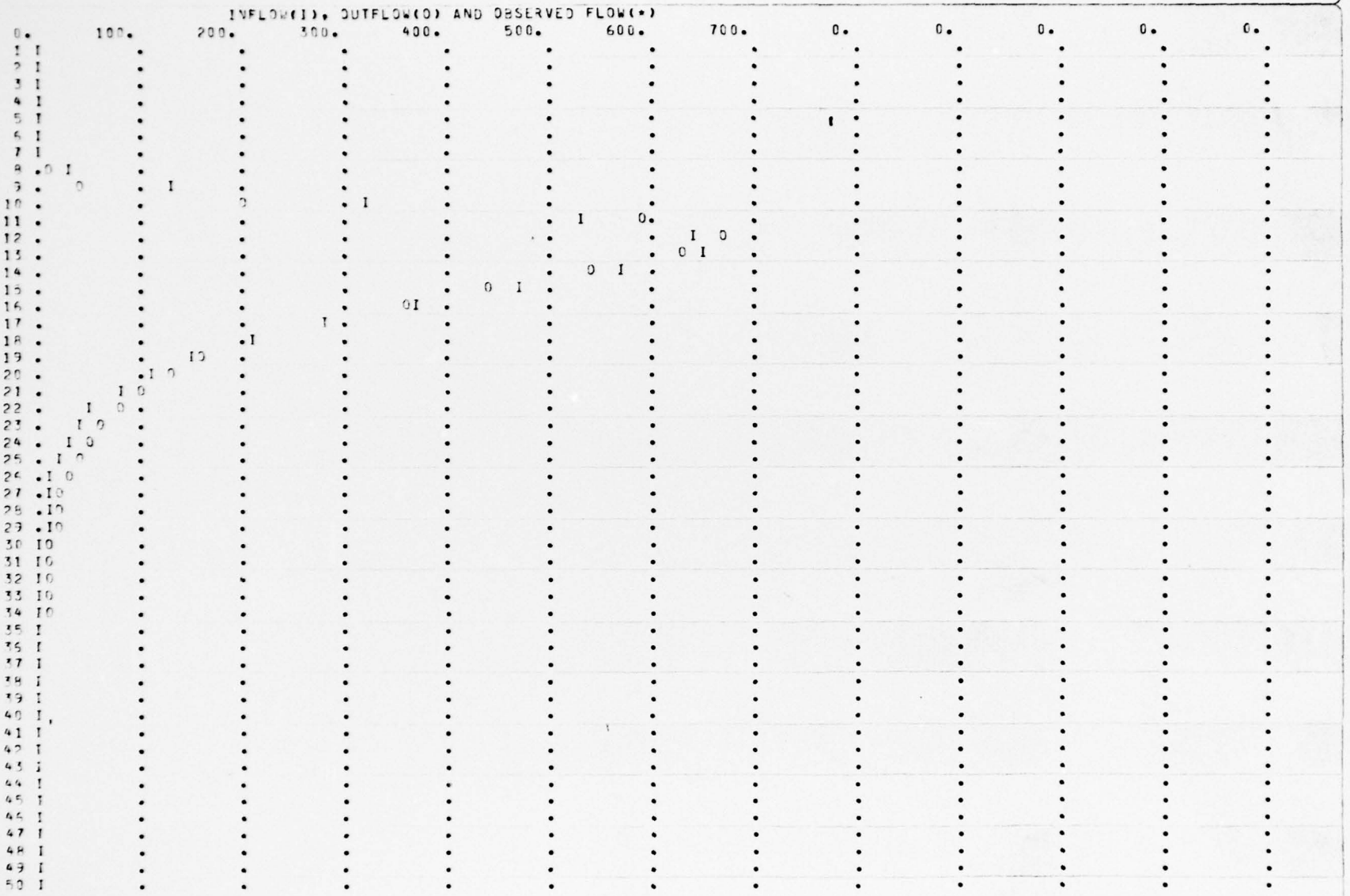
40	0.	0.	1.
41	0.	0.	1.
42	0.	0.	1.
43	0.	0.	1.
44	0.	0.	0.
45	0.	0.	0.
46	0.	0.	0.
47	0.	0.	0.
48	0.	0.	0.
49	0.	0.	0.
50	0.	0.	0.
SUM			4718.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	672.	359.	98.	94.	4718.
INCHES		1.41	1.55	1.55	1.55
AC-FT		178.	195.	195.	195.

MF.

STATION 44

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)



RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	4	571.	371.	98.	94.	2.35
ROUTED TO	44	572.	359.	98.	94.	2.35